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Research Article

Evaluation of seizures of live wild animals in Mexico

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Abstract

In Mexico, the illegal use of wildlife includes any activity related to wildlife that does not comply with current regulations. Seizure is an administrative sanction imposed by the Federal Attorney for Environmental Protection (PROFEPA) as a result of non-compliance with established regulations. There is a lack of official and accessible data on the number and species used and traded illegally in the country. This study aims to identify the species and the number of live wild animals seized by PROFEPA from 2012 to 2023, based on data requested by the National Institute for Transparency, Access to Information, and Personal Data Protection (INAI). During this period, a total of 17,662 live individuals belonging to 579 identified species were seized by PROFEPA. The taxonomic groups seized included mammals, birds, reptiles, amphibians, fish, mollusks, crustaceans, insects, arachnids, and other invertebrates. Birds were the group with the highest number of species seized. The 32 states in the country have records of seizure. A total of 60.3% of the species native to Mexico are included in some category of national risk. Over a nine-year period, animal seizures decreased by 97%. A total of 25 different domestic destinations were reported for the animals after seizure. The number of wildlife seized does not accurately reflect the total number of animals used and trafficked illegally. The use and illegal trade of wildlife in Mexico represents a highly relevant issue that demands strengthening the actions taken so far to eradicate it.

Key words: Illegal use, Mexico, seizure, trade, wildlife

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Introduction

The illegal use of wildlife has negative environmental, social, economic, and governance impacts (UNODC 2024). The resulting damages include direct and irreversible effects on ecosystems and their biodiversity (SEMARNAT 2013). Mexico's biological heritage has been profoundly impacted by anthropogenic actions, including the illegal use of species (Sarukhán 2012). In Mexico, the use of wildlife and its habitat is legal as long as it complies with the provisions established in the General Wildlife Law (Ley General de Vida Silvestre, LGVS) and the General Law of Ecological Balance and Environmental Protection (Ley General de Equilibrio Ecológico y Protección al Ambiente, LGEEPA) (Sosa-Escalante 2011). Within the legal framework for the extractive use of wildlife, capture, understood as the extraction of live specimens from their habitat, may be authorized for purposes of reproduction, restoration, re-

covery, repopulation, reintroduction, translocation, economic, or environmental education (LGVS 2000).

Any activity related to the use of wildlife and its habitat that does not comply with current regulations is considered illegal (Sosa-Escalante 2011). Violations of legal provisions include: (1) conducting wildlife use activities (e.g., capture, collection, and hunting) without the corresponding authorization, (2) possessing specimens outside their habitat without the means to prove their legal origin, (3) failing to comply with established provisions for the humane and respectful treatment of wildlife, (4) exporting or importing specimens without adhering to international treaties to which Mexico is a party, and (5) commercializing specimens without the documentation certifying their legal origin (LGVS 2000; Sosa-Escalante 2011). Violations of the provisions established in laws, regulations, and official Mexican standards related to wildlife and environmental protection are subject to administrative sanctions imposed by the Ministry of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales, SEMARNAT) (LGEEPA 1988; LGVS 2000).

The Federal Attorney for Environmental Protection (Procuraduría Federal de Protección al Ambiente, PROFEPA), a decentralized body of SEMARNAT, has the mission of seeking environmental justice through the effective, efficient, expeditious and transparent application and enforcement of current federal environmental legislation by responding to popular complaints and through inspection, verification, surveillance and use of voluntary instruments (DO 2012; PROFEPA 2017; PROFEPA 2024a). Among its main functions is the imposition of administrative sanctions on those who violate environmental regulations (PROFEPA 2017).

Seizure is one of the administrative sanctions provided for in the legislation (LGEEPA 1988; LGVS 2000) and is understood as a measure through which wildlife specimens, as well as instruments (i.e., material goods linked to the illicit) directly related to the committed infractions or violations, become the property of the State (LGEEPA 1988; LGVS 2000; PROFEPA 2024b). According to the LGVS, seized specimens may be assigned to any of the following destinations: (1) rehabilitation in conservation centers or similar institutions, (2) release into natural habitats, (3) destruction (e.g., in cases where they are products or by-products that could transmit diseases), or (4) donation to public organizations, scientific institutions (public or private), wildlife conservation units, higher education institutions, or charitable organizations. The final destination depends on the nature of the seized specimen and the activities of the receiving entity (LGVS 2000).

The availability of information is key in the fight against the illegal use of wildlife (Guerra-Páramo 2023). Understanding which species are seized is crucial for addressing the negative impacts of their illegal use, designing and implementing conservation and protection strategies, and promoting public awareness and health (Guerra-Páramo 2023; UNODC 2024). In Mexico, information regarding the species and number of animals seized alive is not publicly available. While there are previous studies on the topic, they respond to specific approaches and do not systematically compile all the official data from the last decade (Cantú-Guzmán et al. 2007; Garza-Almanza et al. 2010; Melgoza et al. 2017; Arroyo-Quiroz and Wyatt 2019; Carpio-Domínguez et al. 2021; Masés-

García et al. 2021; Moreno-Lara et al. 2022). This study aims to identify live wildlife species seized in Mexico from January 2012 to June 2023 through the analysis of official data requested from PROFEPA.

Methods

Data collection

Access to detailed information on the species and number of animals seized in Mexico is crucial information that is neither readily available nor easily accessible. This lack of data represents a significant obstacle to studies focused on the illicit use of wildlife (Guerra-Páramo 2023). However, one methodology used in developing countries consists of formal requests for information from the competent authorities in each country (Quevans et al. 2013; Lozano-Suárez et al. 2024); in this case, this was done through the National Transparency Platform (**PNT**).

The PNT is a technological tool developed by the National Institute for Transparency, Access to Information, and Personal Data Protection (Instituto Nacional de Acceso a la Información y Protección de Datos Personales, INAI, dismantled in 2025) to request public information from any authority, institution, or individual that receives or uses federal public funds (INAI 2024).

Through the PNT, and in compliance with national laws, an information request was submitted to PROFEPA (Request No. 330024423001243). The requested information included the following:

- The number and species of animals seized by PROFEPA from 2010 to the present (June 2023) or the most recent available data.
- The type of seizure (live specimens).
- The state within Mexico where the seizure took place.
- The destination of the seized specimens after their seizure.

Data standardization

The requested information was provided in a database structured as follows: year, quantity, scientific name, type of seizure, state, and post-seizure destination. The dataset was standardized as follows:

- In cases where species synonyms were present (i.e., the same species listed under different scientific names) or outdated scientific names were used, the most current scientific name was selected.
- If a higher taxonomic category than species was provided (i.e. genus, family, order), the original classification was retained (e.g. the order Araneae was preserved), while lower taxonomic categories were designated as unknown (e.g. order Araneae was retained, whereas family, genus and species were classified as unknown). When only the genus was specified, the species was marked as sp.
- If the taxonomic category (order, family) could not be identified, these fields were labeled as unknown.

- In cases where multiple species were listed under the same taxon, for the same year and the same quantity of organisms, the species category was designated as unknown, while retaining the higher taxonomic classification when applicable.

Data reporting and analysis

After standardizing the data, each species was classified according to its taxonomic category (order, family), conservation status, levels of regulation of international trade, degree of threat, endemism, and distribution range.

The determination of conservation status at the national level was based on the risk categories established in the Official Mexican Norm NOM-059-SEMARNAT-2010 (DO 2010; DOF 2019) and the list of priority species for conservation (DO 2014). The international conservation status was represented through the threat categories proposed by the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN 2024). The different levels of regulation of international trade, depending on the impact it has on the survival of species, were determined according to the CITES appendices (CITES 2024). Endemism and geographic distribution range were determined using information from NOM-059-SEMARNAT-2010, the IUCN Red List, and the National System of Biodiversity Information (DO 2010; CONABIO 2024; IUCN 2024).

Based on the classification of taxa, the total number of live seized species from January 2010 to June 2023 was summed. The number of animals was quantified by taxonomic group, year, and state in which the seizure took place, as well as their post-seizure destination. Additionally, the total number of live seized species within each risk category was calculated based on NOM-059-SEMARNAT-2010, the IUCN Red List of Threatened Species, and levels of regulation of international trade established by Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Furthermore, the number of endemic, native, and non-native species with distribution ranges outside Mexico was quantified, along with those included in the national priority species conservation list.

Results

Number of seized species

A total of 579 identified species and 62 taxa not identified at the species level were seized by PROFEPA from January 2012 to June 2023. The seized species belong to the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, mollusks, crustaceans, insects, arachnids, and marine invertebrates.

Seizures across all taxonomic groups encompassed 50 orders (3 unidentified), 143 families (10 unidentified), and 363 genera (20 unidentified). Birds were the taxonomic group with the highest number of seized orders (17; 1 unidentified), families (46; 2 unidentified), genera (169; 5 unidentified), and species (270; 26 unidentified) (Table 1).

The three orders with the highest number of species were: Passeriformes (Birds; 104 species, 19 unidentified), Squamata (Reptiles; 112 species; 10 un-

Table 1. Total number of taxa by taxonomic classification and total number of individuals per species confiscated by PROFEPA from 2012 to June 2023. The number of unidentified taxa/individuals within each animal group is indicated in parentheses.

Animal group	Taxonomic classification				Number of individuals per group	Total number of individuals per group
	Order	Family	Genus	Species		
Mammals	14 (1)	38(1)	69 (5)	90 (7)	1208 (36)	1244
Birds	17(1)	46 (2)	169 (5)	270 (26)	8064 (318)	8382
Reptiles	3 (1)	31 (3)	82(5)	160 (16)	5731 (313)	6044
Amphibians	2	9	14 (1)	22 (3)	416 (26)	442
Fish	4	7	8	7 (2)	509 (61)	570
Mollusks	1	1	1	1	218	218
Crustaceans	1	1 (1)	1(1)	1 (1)	13 (500)	513
Insects and Arachnids	4	6(2)	15(2)	25(5)	164(7)	171
Marine invertebrates	4	4(1)	4(1)	3 (2)	65 (13)	78
Total	50 (3)	143(10)	363(20)	579 (62)	16388(1274)	17662

identified), Psittaciformes (Birds; 61 species; 4 unidentified). The three families with the highest number of species were: Psittacidae (Birds; 46 species; 3 unidentified), Viperidae (Reptiles; 23 species; 1 unidentified), Accipitridae (Birds; 22 species). The three genera with the highest number of species were: *Crotalus* (Reptiles; 15 species; 1 unidentified), *Icterus* (Birds; 10 species; 1 unidentified), *Kinosternon* (Reptiles; 9 species; 1 unidentified) (Suppl. material 1).

Total number of live seized animals

A total of 17,662 live animals were seized by PROFEPA over a period of more than ten years. This corresponds to an average of $\bar{x}$ = 1,606 (SD = 16.07) individuals per year over a ten-year period.

Birds were the taxonomic group with the highest number of seized live organisms (n = 8,382 individuals; 47.46%), followed by reptiles (n = 6,044; 34.22%), mammals (n = 1,244; 7.04%), fish (n = 570; 3.23%), crustaceans (n = 513; 2.90%), amphibians (n = 442; 2.50%), mollusks (n = 218; 1.23%), insects and arachnids (n = 171; 0.97%), and marine invertebrates (n = 78; 0.44%). Table 1 presents the total number of live seized animals by taxonomic group.

The year with the highest number of seized individuals was 2013, while the year with the lowest number of seized individuals was 2023 (through June). The analysis of the total number of seized individuals per year and taxonomic group is shown in Fig. 1.

The three orders with the highest number of live seized individuals were: Passeriformes (Birds; n = 4,300), Testudines (Reptiles; n = 3,422), Psittaciformes (Birds; n = 2,866). The three families with the highest number of individuals were: Psittacidae (Birds; n = 2,752), Emydidae (Reptiles; n = 2,495), Cardinalidae (Birds; n = 1,176). The three genera with the highest number of individuals were: *Trachemys* (Reptiles; n = 2,341 individuals), *Aratinga* (Birds; n = 1,111), *Iguana* (Reptiles; n = 803). The three species with the highest number of individuals were: *Trachemys scripta elegans* (n = 1,497 individuals), *Aratinga canicularis* (n = 1,099 individuals), *Iguana* (n = 797 individuals) (Suppl. material 1).

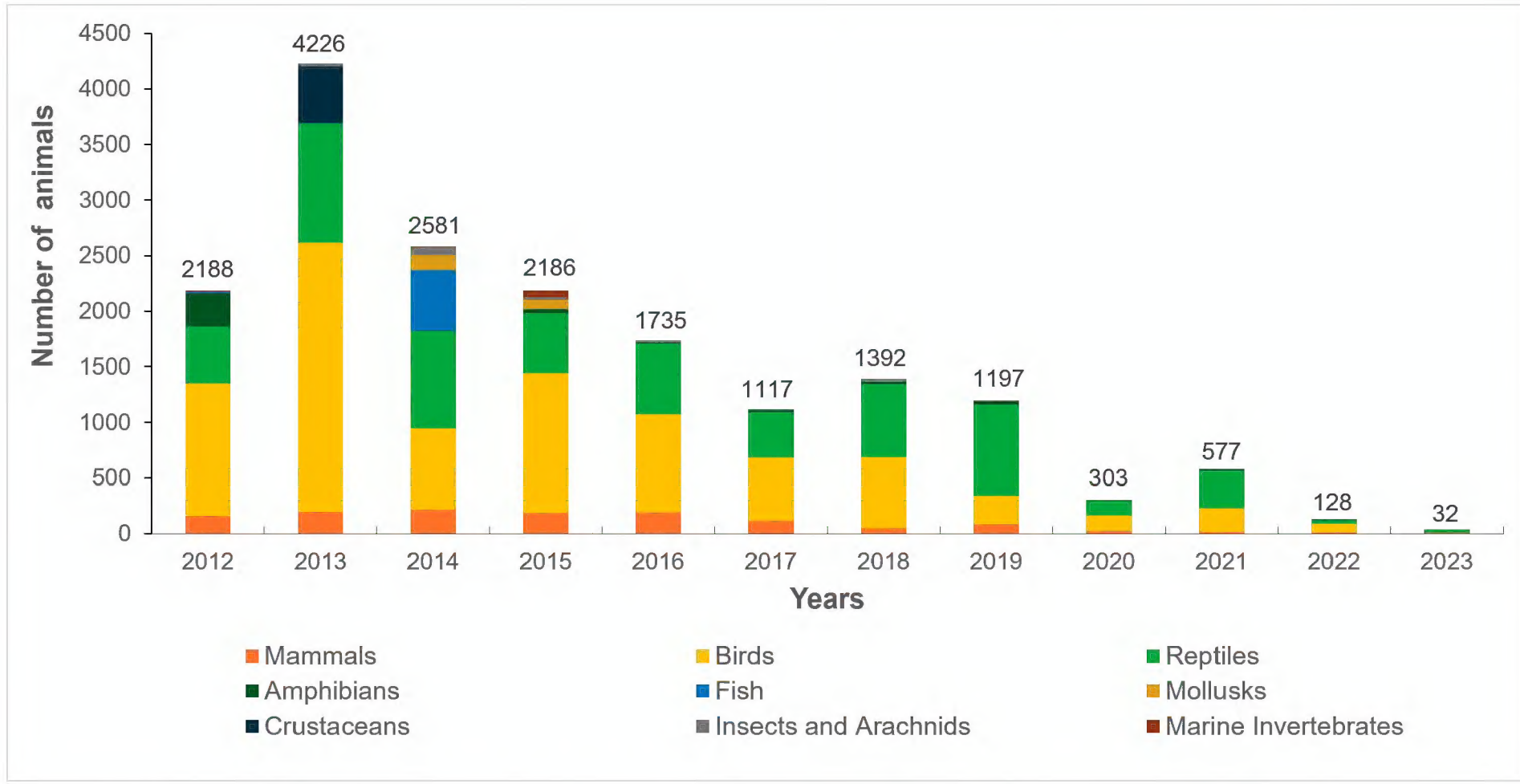

Figure 1. Number of animals per group and per year seizure by PROFEPA. Seizures were made from January 2012 to June 2023. The number of animals in 2023 is reported up to June. The total number of animals per year is presented above the bars.

States with seizures

All 32 states of the Mexican Republic reported the seizure of live animals over the past decade. The five states with the highest number of seizures were: Mexico City, Oaxaca, Morelos, Veracruz and Yucatan. Conversely, the five states with the lowest number of seized individuals were: Nayarit, Zacatecas, Coahuila, Tamaulipas and Sonora (ranking the lowest) (Table 2, Fig. 2). The analysis of the total number of seized individuals per state and taxonomic group can be seen in Table 2 and Fig. 2.

Geographic distribution, conservation status, threat, and risk of species

Of the 579 identified species, a total of 418 (72%) are native to Mexico. Among these 418 species, 322 (77%) are naturally distributed in the country, 81 (19.4%) are endemic, and 15 (3.6%) are introduced species (Table 3). Additionally, of the 418 species present in Mexico, 252 (60.3%) fall under one of the risk categories defined by NOM-059-SEMARNAT-2010. Furthermore, 76 species (18.2%) are classified as priority species for conservation (Table 3).

Among the 579 identified seized species, 548 (94.65%) are categorized within the IUCN Red List. A total of 93 species (16%) fall within the threatened categories (Critically Endangered, Endangered, and Vulnerable). A total of 455 species (78.6%) are classified under non-threatened categories (Near Threatened, Least Concern, and Data Deficient). Additionally, 31 species (5.4%) are not assigned to any IUCN category (Table 3).

Of the 579 identified species seized, 291 (50.25%) are listed in the Suppl. material 1: appendices of CITES. Specifically: 46 species (7.95%) are listed in Suppl. material 1: appendix I (species endangered by trade), 202 species (34.89%) are

Table 2. Number of animals per taxonomic group confiscated by PROFEPA from 2012 to June 2023, by state in Mexico

State	Animal Group									Total
	Mammals	Birds	Reptiles	Amphibians	Fish	Mollusks	Crustaceans	Insect and Arachnids	Marine invertebrates	
Aguascalientes	1	143	3	0	0	0	0	1	0	148
Baja California	62	71	76	0	557	218	0	2	47	1033
Baja California Sur	15	163	205	0	3	0	0	4	11	401
Campeche	14	63	10	0	0	0	0	0	0	87
Chiapas	41	55	282	0	0	0	0	5	0	383
Chihuahua	37	28	6	0	0	0	0	0	0	71
Coahuila	3	6	0	0	0	0	0	0	0	9
Colima	52	197	68	0	0	0	0	6	0	323
Durango	8	40	2	0	0	0	500	1	0	551
Guanajuato	22	337	50	0	0	0	0	1	0	410
Guerrero	9	130	302	0	0	0	0	0	0	441
Hidalgo	13	122	7	0	0	0	0	1	12	155
Jalisco	51	124	21	0	0	0	0	0	0	196
México	61	762	51	5	0	0	0	0	0	879
Mexico City	279	1768	2796	127	1	0	13	145	3	5132
Michoacán	45	319	128	9	0	0	0	4	5	510
Morelos	56	1100	198	3	2	0	0	0	0	1359
Nayarit	16	8	14	0	0	0	0	0	0	38
Nuevo León	55	21	1	260	0	0	0	0	0	337
Oaxaca	93	1161	362	17	0	0	0	1	0	1634
Puebla	10	207	37	21	0	0	0	0	0	275
Querétaro	0	81	1	0	0	0	0	0	0	82
Quintana Roo	13	10	39	0	0	0	0	0	0	62
San Luis Potosí	4	423	24	0	0	0	0	0	0	451
Sinaloa	10	144	42	0	0	0	0	0	0	196
Sonora	1	1	0	0	0	0	0	0	0	2
Tabasco	2	11	95	0	0	0	0	0	0	108
Tamaulipas	4	0	1	0	0	0	0	0	0	5
Tlaxcala	1	54	0	0	0	0	0	0	0	55
Veracruz	108	251	834	0	7	0	0	0	0	1200
Yucatán	158	571	387	0	0	0	0	0	0	1116
Zacatecas	0	11	2	0	0	0	0	0	0	13
Total	1244	8382	6044	442	570	218	513	171	78	17662

listed in Suppl. material 1: appendix II (species not currently endangered but could become so due to trade), 25 species (4.32%) are listed in Suppl. material 1: appendix III (species subject to regulation to prevent or restrict exploitation), and 18 species (3.1%) have multiple classifications (Table 3). The information on geographic distribution and conservation status by taxonomic group is compiled in Table 3.

Post-seizure destinations

PROFEPA reported 25 different destinations for live animals after their seizure. The distribution of individuals among these destinations is as follows: Private residence (Domicilio particular: n = 7,071; 40%), PROFEPA (n = 3,217; 18.2%),

Table 3. Total number of species confiscated by PROFEPA from 2012 to June 2023, categorized by taxonomic group. The table includes data on geographic distribution, number of species considered nationally priority, national risk categories, conservation status, threat level, and the different levels of regulation of international trade, depending on the impact it has on the survival of species.

Animal group	Geographic distribution				National priority species	NOM-059-SEMARNAT-2010					IUCN Red List							CITES					
	Mx	MxE	Mxi	No	PR	A	P	PR	E	SIN	CR	EN	VU	NT	LC	DD	SIN	I	II	III	A+	NC	SIN
Mammals	46	8	9	27	16	14	18	4	0	54	4	8	10	5	56	3	4	16	13	11	10	0	40
Birds	183	15	5	67	29	26	21	40	5	178	2	12	12	16	226	0	2	19	100	9	2	4	136
Reptiles	71	40	1	48	25	35	12	52	0	61	6	8	19	14	102	5	6	9	72	4	6	0	69
Amphibians	8	12	0	2	3	2	1	11	0	8	3	2	0	2	15	0	0	0	3	0	0	0	19
Fish	4	1	0	2	2	1	2	0	0	4	1	0	3	0	3	0	0	2	2	0	0	0	3
Mollusks	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Crustaceans	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
Insects and Arachnids	5	5	0	15	0	4	0	0	0	21	0	0	0	2	6	0	17	0	11	0	0	0	14
Marine invertebrates	3	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	1	1	0	0	1
Total	322	81	15	161	76	83	55	109	5	327	17	31	45	39	408	8	31	46	202	25	18	4	284

Geographic Distribution: (Mx) Present in Mexico, (MxE) Endemic to Mexico, (Mxi) Introduced species, (No) Its geographic range is not found in Mexico.
National Priority Species: (PR) Priority species.
NOM-059-SEMARNAT-2010: Risk categories. (A) Threatened, (P) Endangered, (Pr) Subject to Special Protection, (E) Probably extinct in the wild, (SIN) Not categorized or no information available.
IUCN Red List: Threat categories. (CR) Critically Endangered, (EN) Endangered, (VU) Vulnerable, (NT) Near Threatened, (LC) Least Concern, (DD) Data Deficient, (SIN) Not categorized or no information available.
CITES: Appendices. (I) Species endangered by trade, (II) Species not currently endangered but could become so due to trade, (III) Species whose exploitation should be prevented or restricted, (A+) Species listed in more than one appendix, (NC) Species not included in the appendices, (SIN) No information available.

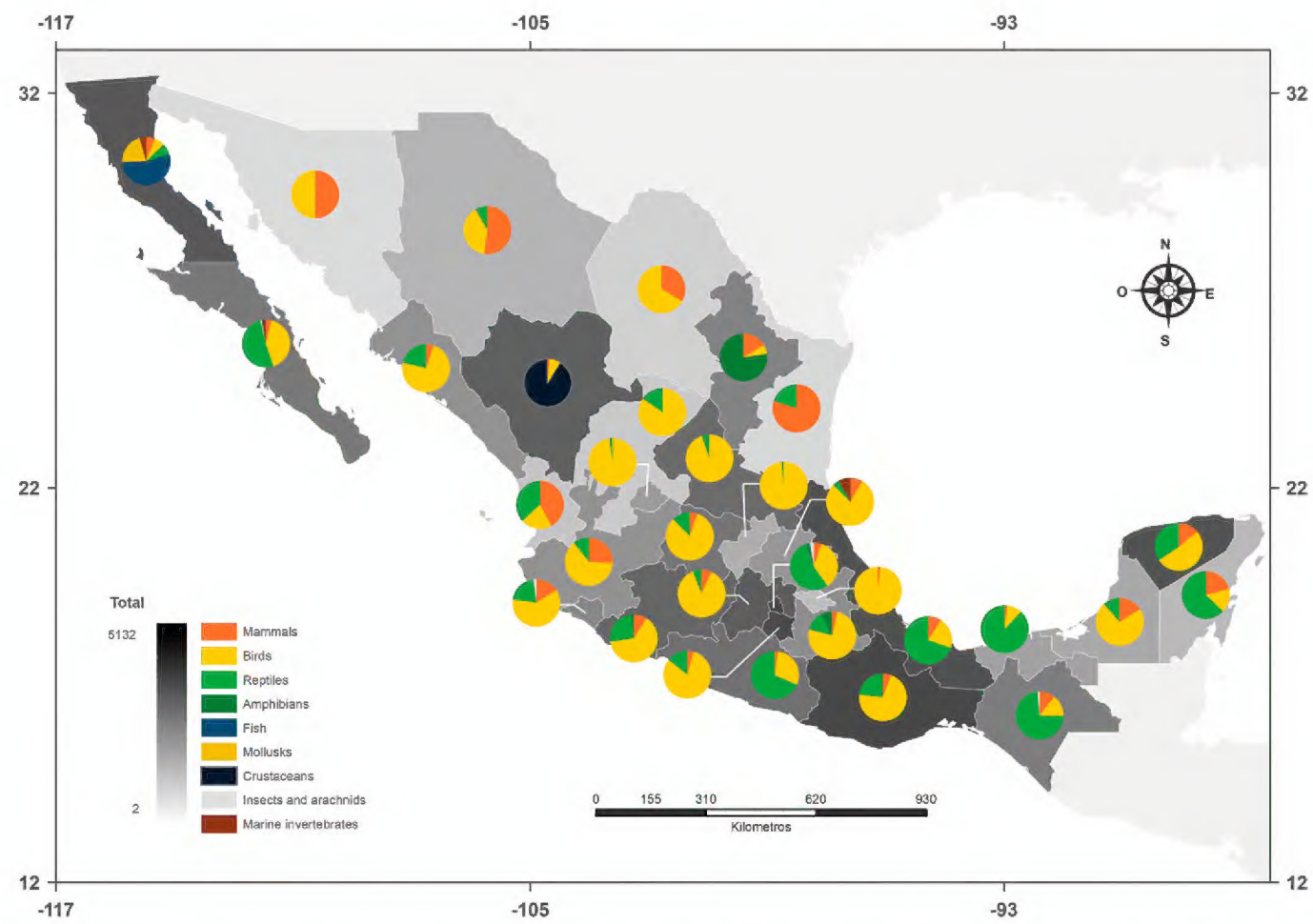

Figure 2. Choropleth map of Mexico showing the number of live animals seized per state by PROFEPA. Seizures were made from January 2012 to June 2023. A gradient in grey shade is used to represent the data, where darker areas indicate states with a higher number of confiscated live animals, while lighter areas indicate states with a lower number of seized live animals. The pie charts represent the number of animals seized by animal group in each state.

Destruction/Release (n = 1,799; 10.2%), Donation (n = 1,514; 8.6%), Units for the Conservation of Wildlife (Unidades de Manejo para la Conservación de Vida Silvestre, UMAs: n = 1,034; 5.9%), Zoos (n = 762; 4.3%), Wildlife Management Facilities (Predios o Instalaciones de Manejo de Vida Silvestre, PIMVS: n = 547; 3.1%), Ecological Center (n = 402; 2.3%), Educational Center (n = 302; 1.7%), Aquarium (n = 252; 1.4%), Wildlife Conservation and Research Centers (Centros para la Conservación e Investigación de la Vida Silvestre, CIVS: n = 252; 1.4%), Iguana Sanctuary (Iguanario: n = 156; 0.9%), Farm (n = 127; 0.7%), Conservation Center (n = 50; 0.3%), Veterinary Facility (n = 44; 0.2%), Park (n = 37; 0.2%), Bio-park (n = 29; 0.2%), Circus (n = 17; 0.1%), Herpetarium (n = 13; 0.07%), Nursery (n = 13; 0.07%), Aviary (n = 8; 0.05%), University (n = 6; 0.03%), Rehabilitation Center (n = 5; 0.03%), Garden (n = 4; 0.02%), Museum (n = 1; 0.01%). Information on the total number of individuals per taxonomic group and their post-seizure destination is visualized in Fig. 3.

Discussion

The data obtained in this study indicate that the illegal use of live wildlife is a significant issue in Mexico. This activity has been understudied in the country, despite its interrelated negative impacts on the environment, socioeconomics,

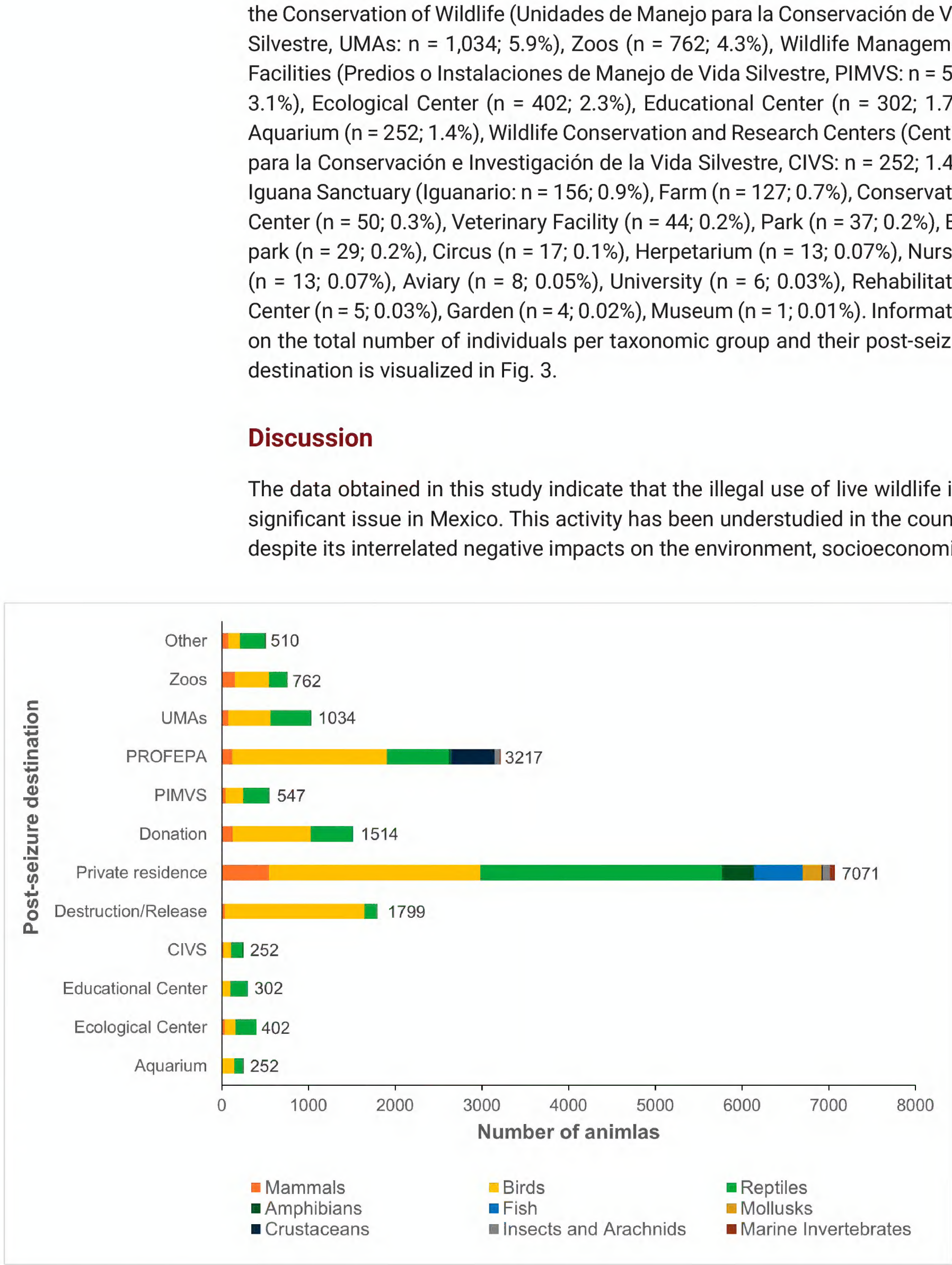

Figure 3. Total number of animals per taxonomic group and post-confiscation destination from January 2012 to June 2023. The Other category includes the following destinations: iguana sanctuary, farm, conservation center, veterinary facility, park, bio-park, circus, herpetarium, aviary, nursery, university, rehabilitation center, museum, and garden. UMAs: Units for the Conservation of Wildlife. PIMVS: Wildlife Management Facilities. CIVS: Wildlife Conservation and Research Centers. The total number of animals by post-confiscation destination is presented above the bars.

and governance (Sosa-Escalante 2011; Moreno-Lara et al. 2022). Environmental consequences include the overexploitation of species, ecosystem and climate impacts, biodiversity loss, the spread of invasive species, and disease transmission, including zoonotic diseases (Carpio-Domínguez et al. 2021; Mozer and Prost 2023; UNODC 2024). Socioeconomic damages include loss of well-being and livelihoods, high costs associated with combating the illegal use of animals, and the expenses related to ecosystem recovery (Carpio-Domínguez 2023; Mozer and Prost 2023; UNODC 2024). Governance-related damages include the weakening of the rule of law, loss of public revenue, and financial costs of law enforcement (UNODC 2024).

The illegal wildlife trade is a global issue (Mozer and Prost 2023). The World Wildlife Crime Report elaborated by UNODC (2024) records seizure events from 162 countries and territories, including Mexico. These records, covering the period 2015–2021, report that approximately 4,000 wildlife species were seized worldwide (UNODC 2024). In the same report, Mexico was recorded with 1,500 and 3,000 seizures. However, the report does not specify the number of species or individuals seized. Similarly, our data obtained from PROFEPA did not include the number of seizure events. Comparing seizures should be approached with caution, given the variety and complexity of species involved in each case. A seizure involving hundreds of crustaceans in a single box cannot be equated to an event involving a large mammal (UNODC 2020).

Regarding the number of seized species, our results show that from 2015 to 2021, a total of 465 wildlife species were seized in Mexico, representing a significant 11.63% of the total number of wildlife species globally recorded as seized (UNODC 2024).

Number of seized individuals

At the global level, it has been reported that between 2012 and 2014, a total of 47,571 individual animals, including vertebrates, insects, arachnids, marine invertebrates, and mollusks, were seized in 54 different countries (D'Cruze and Macdonald 2016). Our results indicate that, for the same years and taxonomic groups, a total of 8,482 individuals were seized in Mexico, representing 17.8% of all organisms seized worldwide. This is a highly significant proportion, especially considering that Mexico was not included in the global report (D'Cruze and Macdonald 2016).

At the national level, there are notable differences in the reported number of seized individuals compared to our data. Melgoza et al. (2017) reported that between 2014 and 2016, a total of 4,704 animals were seized across the country. In contrast, our data indicate that 6,502 individuals were seized during the same years, 38.22% higher than their estimate. Additionally, the number of individuals reported by Melgoza et al. (2017) per state differs from our findings. The states of Coahuila, Tamaulipas, Quintana Roo, Chihuahua, Sonora, Sinaloa, San Luis Potosí, Nayarit, and Guerrero reported a higher number of seized animals compared to our data. However, the states of Nuevo León, Querétaro, Tlaxcala, and Zacatecas reported the same number of seized organisms. For the remaining unlisted states, the number of seized animals was lower in previous reports compared to our findings.

Similarly, regional studies show differences in the reported number of seized individuals when compared to our study. From 2012 to 2018, a total of 2,322

vertebrates (herpetofauna, birds, and mammals) were reported as seized in the state of Oaxaca alone (Masés-García et al. 2021). In contrast, our data show that for the same years and taxonomic groups, a total of 1,630 vertebrates were seized in Oaxaca, a 42.45% lower figure. The differences in the number of seized individuals between studies and our data may be due to variations in the type of information requested and provided (e.g., taxonomic groups, years covered, type of seizure, etc.) by the authorities. Furthermore, our data only include live animal seizures, meaning they do not account for seizures of dead animals or wildlife products and derivatives, unlike previous studies.

Although our data provide an approximation of the species and number of animals used illegally in Mexico, they do not accurately reflect the total number of species and individuals involved in illegal trade. Cantú-Guzmán et al. (2007) evaluated the illegal trafficking of psittacines at the national level and found that PROFEPA seizures accounted for only 2% of total illegal captures, indicating that our data represent only a small fraction of the total number of wildlife individuals used illegally.

Additionally, media reports on illegal wildlife trade in Mexico differ substantially from our data. In November 2020, a joint operation involving the National Guard, PROFEPA, and the Attorney General's Office (Fiscalía General de la República, FGR) resulted in the seizure of 15,785 live wildlife specimens found in two residences in Mexico City (GN 2020; Miranda 2021; Méndez and Olivera 2022). However, our 2020 data show that PROFEPA seized only 303 live organisms in total. This single media-reported operation alone accounts for 89.4% of all wildlife individuals registered by PROFEPA between 2012 and June 2023. The significant discrepancy between these figures is because, in this particular case, the animals were not seized by PROFEPA. Instead, PROFEPA acted only as a technical support agency, assisting in species identification and issuing the corresponding report. The seizure of wildlife specimens was carried out by the National Guard's Investigation and Internal Affairs Units, under search warrants issued by the FGR, as part of a criminal investigation (information request response 330024424001505). Despite being the authority responsible for collecting evidence in environmental crime cases and serving as Mexico's CITES enforcement agency, PROFEPA does not have the authority to prosecute environmental crimes (Melgoza et al. 2017; UNODC 2014).

Most frequently seized species

Birds are the animal group with the highest number of species and individuals seized in Mexico. Approximately 11% of the world's bird species inhabit Mexico, placing the country in 11th place globally for bird diversity (Navarro-Sigüenza et al. 2014). Most wild birds are captured in their natural habitat for commercial purposes, while a small fraction is bred in captivity for sale (Roldán-Clarà et al. 2017). The Passeriformes (sparrows, cardinals, orioles, etc.) represent the bird group with the greatest species richness in Mexico, with 540 species (Navarro-Sigüenza et al. 2014). It is not surprising, then, that this group has the highest number of species (n = 104 species, 19 unidentified) and individuals seized (n = 4,300). Passerines (order Passeriformes) are the most commonly birds that are kept as pets in Mexico, and their species are frequently sold in markets by local bird traders (Roldán-Clarà et al. 2017).

Meanwhile, the Psittaciformes (parrots, macaws, cockatoos, parakeets, etc.) in Mexico include 22 species, six of which are endemic (Navarro-Sigüenza et al. 2014; Cantú-Guzmán et al. 2007). Our data show that this group ranks among the top three orders with the highest number of species (61 species, 4 unidentified) and individuals seized (n = 2,866). Psittacids dominate the global pet bird trade (UNODC 2016). The illegal trade of parrots has been a significant concern in Latin American countries, including Mexico (UNODC 2016). Reports do not specify whether the parrots seized in Mexico are destined for local or international markets (UNODC 2016).

Cantú-Guzmán and colleagues (2007) assessed the illegal trade of psittacines in Mexico and estimated that between 65,000 and 78,500 parrots were captured annually, with a mortality rate exceeding 75% before reaching the final consumer. The majority of illegally captured parrots are sold as pets within Mexico; only a smaller fraction is trafficked abroad. This resulted in the death of between 50,000 and 60,000 individuals annually. They explain that, of every 100 captured parrots, 93 individuals survived capture. Of these, only 69 survived the collection and confinement stage. Subsequently, 47 managed to survive transportation, and ultimately, only 23 individuals arrived alive at the point of sale. As a protection measure, authorities implemented a ban on extractive activities targeting psittacids in 2008 (Article 60 Bis 2 of the General Wildlife Law) (DOF 2008). Thanks to the implementation of this measure, and according to estimates, illegal trafficking of psittacids was reduced by 47.14% between 2009 and 2021, which has prevented the annual capture of between 31,000 and 37,000 individuals (Cantú-Guzmán et al. 2022). According to UNODC (2016), approximately 2,000 psittacids were seized in Mexico between 2007 and 2014. Similarly, our data indicate that 2,886 psittacids were seized between 2010 and June 2023.

Reptiles were the second-largest group in terms of the number of species and individuals seized (n = 6,044 individuals). Mexico ranks second worldwide in reptile diversity, hosting approximately 10% of global diversity (Luna-Reyes et al. 2013). Wild reptiles from Mexico are often illegally traded in the United States, Europe, and Asia for their skins, derivatives, and as pets, making Mexico one of the main illegal reptile exporters to the United States (Petrossian et al. 2016; UNODC 2016; Arroyo-Quiroz and Wyatt 2019; Moreno-Lara et al. 2022). Between 2005 and 2014, it is estimated that 875 reptile skins from Mexico were seized from the illegal international market (UNODC 2016). Our data show that two reptile taxa, *Trachemys scripta elegans* and *Iguana*, are among those with the highest number of individuals seized (n = 1,497 and n = 797, respectively). In the case of *I. iguana*, the data align with findings from Oaxaca, where it is recognized as one of the most frequently seized and conservation-priority endemic species in Mexico (Masés-García et al. 2021).

Mammals were the third-largest group with 1,244 individuals seized. The illegal use of mammals poses risks to human safety, including physical and health risks, such as the transmission of infectious diseases (Garber et al. 2024). Our findings indicate that emblematic mammal species have been seized, including non-human primates and large felines. Primate populations are threatened by illegal capture for food, medicine, pets, and biomedical research (Garber et al. 2024). We recorded a total of 174 seized individuals belonging to 11 species of non-human primates (Suppl. material 1). Notably, eight species are not native to Mexico, including the African-origin species *Papio hamadryas* (Hama-

dryas baboon) with 18 individuals. A total of 117 seized primates (67%) corresponded to *Ateles geoffroyi* (Geoffroy's spider monkey), an endangered species widely purchased as pets in Mexico (Rodríguez-Luna et al. 1996). Furthermore, eight species of seized primates are listed under threat categories, including *Cebus olivaceus* (wedge-capped capuchin), which is critically endangered (IUCN 2024) (Suppl. material 1).

National media reports highlight mammals, particularly large felines, as the most frequently mentioned exotic animals kept as pets (Carpio-Domínguez 2023). Our data show that 225 individuals belonging to the Felidae family were seized. Notably, *Panthera tigris* (tiger) had the highest number of seized individuals (72), followed by *Panthera leo* (lion, 40 individuals), *Panthera onca* (jaguar, 22 individuals), *Puma concolor* (puma, 16 individuals), and *Panthera pardus* (leopard, 2 individuals) (Suppl. material 1). Despite efforts to protect wildlife, current national regulations do not prohibit keeping large felines as pets (Méndez and Olivera 2022). In 2022, the Chamber of Deputies approved and submitted a bill to the Senate to amend the General Wildlife Law (LGVS), prohibiting the ownership of any wild feline species as pets (CD 2022). However, as of now, the Senate has not taken action to review the bill (López-Dávila 2023).

Mexico harbors remarkable marine biodiversity and ranks among the world's top twenty fishing producers; however, part of this activity takes place outside the bounds of legality and sustainability, facilitating the illegal trafficking of marine species (Torres-Alfaro et al. 2023). Illegal, unreported, and unregulated fishing is a growing phenomenon (Torres-Alfaro et al. 2023). In this context, our results show that 87% of the seized fish correspond to *Totoaba macdonaldi* (totoaba), a species endemic to the Gulf of California. Its capture is driven by the high demand for its swim bladders in the Chinese market, where they fetch prices ranging from USD 20,000 to 25,000 (SEMARNAT 2013; Arroyo-Quiroz and Wyatt 2019; Alvarado-Martínez and Ibáñez-Alonso 2021; UNODC 2024). Totoaba are caught within the protected area of the Gulf of California porpoise (*Phocoena sinus*), or vaquita marina, a species that is incidentally trapped in fishing gear – contributing to its imminent extinction (Arroyo-Quiroz and Wyatt 2019; Alvarado-Martínez and Ibáñez-Alonso 2021). Various drug cartels have diversified into the illegal wildlife trade, including totoaba, using the same routes and methods employed for drug trafficking, adapting to new markets through corruption and violence (Melgoza et al. 2017; Alvarado-Martínez and Ibáñez-Alonso 2021; UNODC 2024). Organized crime operates through illegal fishing networks and bribes to officials to facilitate the shipment of swim bladders from Mexico to Asia, potentially with the complicity of customs authorities in Mexico, the United States, and Hong Kong (Alvarado-Martínez and Ibáñez-Alonso 2021). This practice carries serious social, economic, security, and environmental implications (Alvarado-Martínez and Ibáñez-Alonso 2021; Torres-Alfaro et al. 2023).

The low volumes detected in the illegal use of other taxonomic groups (e.g., amphibians, crustaceans, mollusks, insects, arachnids, and marine invertebrates) may be attributed to limited law enforcement, as not all groups receive equal attention (UNODC 2016; Fukushima et al. 2020). Studies on the illegal use of animals primarily focus on charismatic vertebrate species (Fukushima et al. 2020). Additionally, individuals from certain taxonomic groups, such as mollusks, are almost entirely seized as dead specimens (Petrossian et al. 2016).

Seizures over time

The number of wildlife seized varies over time, with our data showing a marked decrease in recent years. Reports for 2022 and 2023 (up to June) reveal an alarming 97% and 99% decrease, respectively, in the number of seized animals compared to 2013, the year with the highest number of seizures (Fig. 1). The absence of seizures could reflect a lack of governance and weak enforcement of laws, rather than evidence that illegal activity is no longer occurring (UNODC 2024). Variations in the prevalence of illegal wildlife use over time may be related to the efforts of competent law enforcement authorities tasked with combating these activities (Masés-García et al. 2021). The increase in the number of seizures in the coming years could represent concrete evidence of the strengthening of efforts and institutional interests to combat the illegal use of wildlife.

The budget allocated to institutions responsible for law enforcement is essential for ensuring compliance (WDR 2011). Since 2016, environmental policy in Mexico has faced a drastic budget reduction, which has deepened over the years and led to significant environmental costs (Vega-López 2020). Key institutions, such as PROFEPA and other decentralized administrative bodies under SEMARNAT, share only 5% of the federal environmental budget, which severely limits their operational capacity and contributes to delays in environmental management in the country (Vega-López 2020). The budget allocated to PROFEPA was reduced by a concerning 53.34% (adjusted for inflation) between 2012 and 2023 (SHCP 2024). Environmental enforcement capacity in Mexico has been compromised by the shortage of PROFEPA inspectors, whose roles are essential for enforcing the law and preventing illegal activities (Castro-Salazar and Camacho-García 2020). This limitation is intensified by high staff turnover, the vast territorial coverage, and the numerous duties inspectors must perform, such as inspecting wildlife in the possession of private individuals and zoos (Castro-Salazar and Camacho-García 2020; Castro-Salazar 2021. Furthermore, inspectors face challenges due to long distances, time constraints, and lack of resources, which affects their ability to effectively respond to environmental offenses (Castro-Salazar 2021). To address the illegal use of wildlife, it is essential for the competent authority to enforce the law effectively (Masés-García et al. 2021). In addition, adequate budget allocation is needed to strengthen institutional structures, train personnel, increase staffing in large and biodiverse areas with vulnerable species, ensure proper care of seized specimens, and remove them from the illegal trade chain (Jiménez-Bustamante and Díaz-Rentería 2018; Masés-García et al. 2021; Castro-Salazar 2021.

States with the highest number of seized animals

Our data show that the states with the highest number of seized animals are Mexico City (n = 5,132; 29.1%), Oaxaca (n = 1,634; 9.25%), Morelos (n = 1,359; 7.7%), Veracruz (n = 1,200; 6.8%), and Yucatán (n = 1,116; 6.3%) (Table 2, Fig. 2). The relationship between the state and the number of seized animals depends on multiple factors related to each state's specific characteristics.

Mexico City (CDMX) is considered the hub of illegal wildlife trafficking in Mexico, with specialized markets (e.g., for amphibians and reptiles, such as the Morelos and Mixhuca markets) and general markets where all types of spe-

cies can be purchased (e.g., Tepito and Sonora markets) (Méndez and Olivera 2022). Oaxaca and Veracruz are considered two of the most biodiverse states, which facilitate greater illegal wildlife collection and trafficking routes (Méndez and Olivera 2022). In Morelos, the presence of illegal wildlife trafficking networks has been identified (Carpio-Domínguez et al. 2023). Finally, Yucatan is one of the states with the highest levels of illegal wildlife collection (Méndez and Olivera 2022), in addition to being a key starting point for international bird trafficking routes (UNODC 2024).

The states with the lowest number of seized animals are located in the northern region of the country (Table 2, Fig. 2). This northern border area fosters the formation of criminal groups engaged in various types of illegal trafficking (Carpio-Domínguez et al. 2022; Carpio-Domínguez et al. 2023). It is notable that illegal trafficking networks involving certain bird species and mammals, including large felines, have Tamaulipas as their destination (Carpio-Domínguez et al. 2022; Carpio-Domínguez et al. 2023). Tamaulipas is one of the states neighboring Texas. The most recent wildlife confiscation reports in Tamaulipas (2012 and 2017) involved illegal possession of five individuals rather than species trafficking, as might be expected (Carpio-Domínguez et al. 2018). Therefore, Tamaulipas could act as a transit state for exotic species, while seizures of exotic animals as pets could be attributed to social empowerment activities and an affinity for animals among criminal groups (Carpio-Domínguez et al. 2018; Carpio-Domínguez et al. 2023).

Conservation status of seized species

An alarming 60.3% of the species present in Mexico that were seized are listed in a risk category according to national regulations for the protection of native species (NOM-059-SEMARNAT-2010). Furthermore, 18.2% of the species are considered priority species for conservation, and 19.4% of endemic species were illegally used (Table 3). Of the total identified species, 16% are categorized as threatened by the IUCN Red List, and 50.25% are listed in one of the CITES appendices (Table 3). It is noteworthy that 6.7% of the species are classified as Data Deficient (DD) or No Information Available (SIN) by the IUCN Red List (Table 3). Once these species are assessed or the relevant information becomes available, they could be reclassified as threatened. These findings highlight the magnitude of the issue and emphasize the need for the implementation or improvement of current strategies to protect animals used illicitly (see further details in the situational analysis section).

Post-seizure destinations

Of the 25 possible post-seizure destinations reported, an unexpected 40% of wildlife animals remain in the private residence where they were seized. PROFEPA inspectors opt to leave the animals under the care of their illegal owners, provided the animals are in good condition (Melgoza et al. 2017). In these cases, an administrative seizure is carried out, explaining to the owner that the animal belongs to the nation and is officially placed under their custody (Melgoza et al. 2017).

In Mexico, a wild animal that has been removed from its natural environment is virtually impossible to reintegrate into its habitat (Melgoza et al. 2017). Wild

animals that become accustomed to humans may not exhibit the necessary behaviors to evade predators or hunt, which can reduce their chances of survival in the wild (Cope et al. 2022). Castro-Salazar et al. (2024) analyzed the operation of the Wildlife Conservation and Research Centers (Centros para la Conservación e Investigación de la Vida Silvestre, CIVS) in Mexico during the period from 2005 to 2020. These centers, operated by the federal government, are responsible for receiving, rehabilitating, relocating, and reintroducing to the wild rescued, secured, or confiscated wildlife specimens. The study revealed that the main taxonomic groups admitted to CIVS, in descending order, were: reptiles, birds, mammals, arachnids, amphibians, crustaceans, corals, and fish. It was found that 69.5% of admissions came from seizures and confiscations carried out by PROFEPA and the FGR. Moreover, more than half of the cases were linked to ongoing legal proceedings, which prevents animals from being released until their legal status is resolved. Regarding outcomes, relocation or transfer accounted for 45.1%, death for 41.5%, and successful release into the wild only 11.4%, indicating a concerning mortality rate that exceeds the rate of successful reintegration. The study also documents a significant reduction in budget and personnel beginning in 2016, which led to the closure of several CIVS, despite an increase in admissions observed in 2019. This situation compromises care, rehabilitation, and release processes, increasing the risk of disease, injury, or suffering during prolonged captivity. The authors emphasize the urgent need to strengthen CIVS through adequate budget allocations, expedite legal processes related to wildlife possession, and establish post-release monitoring programs to evaluate survival and adaptation rates of animals reintroduced into their natural habitat.

The Mexican government promotes the management and conservation of wildlife species through Wildlife Conservation, Management, and Sustainable Utilization Units or Units for the Conservation of Wildlife (Unidades de Manejo Ambiental or UMAs) and Wildlife Management Programs (Programas de Manejo de Vida Silvestre or PIMVS) (Valdez et al. 2006; Masés-García et al. 2016), that is, facilities that manage wildlife in a confined way. However, the handling of wildlife in these environments does not guarantee legitimate or sustainable practices (Masés-García et al. 2021). Among observed irregularities, species laundering has been detected. Due to the lack of traceability, seized specimens can be labeled as captive-bred and subsequently re-commercialized (Méndez and Olivera 2022). Furthermore, species without proper permits are used, and management and utilization activities are conducted without the necessary authorizations (Masés-García 2015).

It was reported that 10% of seized organisms were designated for destruction/release. Current regulations specify that destruction is only allowed when dealing with wildlife products or by-products that may transmit diseases (LGEEPA 1988; LGVS 2000). Therefore, for live wildlife data, this may include release of individuals or death followed by destruction. Other reported destinations, such as zoos, ecological and educational centers, aquariums, iguana sanctuaries, farms, veterinary facilities, bio-parks, circuses, herpetariums, aviaries, nurseries, universities, rehabilitation centers, gardens, and museums (Fig. 3), are considered appropriate for the development of the organisms based on their nature and national law (LGEEPA 1988; LGVS 2000). In 2015, a law came

into effect prohibiting circuses from using wildlife animals (LGVS 2000). Consequently, circuses are no longer considered a possible final destination for seized animals. However, the destination of the wildlife animals previously belonging to circuses remains unknown.

Reasons for wildlife seizures in Mexico

Among the various violations of legal provisions, illegal trafficking and trade of species stand out as the most significant (UNODC 2024). Globally, it is estimated that illegal wildlife trafficking generates between $7 billion and $23 billion annually, making it one of the top 10 most profitable illicit businesses worldwide (GFI 2017; FATF 2020). Mexico plays a key role in illegal wildlife trafficking due to its high biodiversity, geographic location, and trade connections with various countries, particularly the United States, the European Union, and China (SEMARNAT 2013; Arroyo-Quiroz 2023). The United States and European Union are the primary consumers of wildlife for the pet trade, while China has the highest demand for wildlife used as ingredients in food and traditional medicine (Arroyo-Quiroz and Wyatt 2019; Arroyo-Quiroz 2023).

From a commercial perspective, Mexico has a long history of serving as an international transit hub for wildlife, with significant levels of importation, re-importation, and re-exportation of non-native species (Arroyo-Quiroz and Wyatt 2019; Arroyo-Quiroz 2023). Our data reveal that 28% of seized species (n = 161) have geographic ranges outside of Mexico (Table 3). Therefore, the use of these species likely serves both international and domestic market demands, confirming that Mexico continues to function as an *entrepôt* country.

The illegal trade of native species, involving activities such as transportation, storage, and sale, is the most frequently reported illicit activity (Masés-García et al. 2021; Arroyo-Quiroz 2023). The domestic trade of wildlife in Mexico is driven primarily by the desire to own wild animals as pets, the curative properties attributed to traditional medicine, and their use for consumption, rituals, amulets, and crafts (SEMARNAT 2013; Melgoza et al. 2017). Wildlife collection and sales markets are found throughout the country, and the types of species traded vary by state and market (Melgoza et al. 2017).

In addition to illegal trafficking, other violations of wildlife laws have been reported in Mexico, leading to seizures (Masés-García et al. 2021). Masés-García and colleagues (2021) documented wildlife law violations in Oaxaca between 2004 and 2018, identifying 609 cases of illegal activities in the state. The breakdown of these cases is as follows: 230 cases (38%) involved illegal species trafficking; 198 cases (33%) involved illegal possession, where owners could not prove the legal origin of wildlife, such as when animals were kept as pets, amulets, or for traditional medicine, rituals, and crafts; 98 cases (16%) involved authorized schemes (UMA and PIMVS) that violated the law through mismanagement; 76 cases (12%) were related to poaching; 5 cases (1%) involved non-compliance with government-issued permits; 1 case (0.3%) involved illegal scientific collection. This data underscores the variety of ways in which wildlife laws are violated in Mexico and highlights the importance of addressing both trafficking and other illegal activities to protect biodiversity and wildlife.

Importance of seizure data

Seizures provide a wealth of information, not only about the species used illegally but also about the participants and methods employed to commit these crimes, provided that authorities properly record such information (UNODC 2024). Despite their importance, official seizure data often pose challenges in terms of accessibility (Paudel et al. 2022). Guerra-Páramo (2023) emphasizes the importance of access to seizure data in mitigating the illegal use of species. They highlight that data derived from seizures are fundamental in combating the illegal wildlife trade and in informing governmental decisions and actions to address this crime. Additionally, the development of seizure databases has facilitated international collaboration, enabling the identification of transnational trafficking networks and illustrating that the problem is both global and dynamic. The use and analysis of seizure databases improve the effectiveness of interventions aimed at protecting threatened and endangered species, promote the sustainable use of natural resources, and contribute to ensuring the health and safety of communities.

Situational analysis

The illegal use of wildlife in Mexico is a complex and multifactorial phenomenon (Carpio-Domínguez et al. 2023). There is widespread ignorance of current legislation, insufficient oversight capacity among authorities, and ineffective enforcement of existing regulations (Cossío-Bayúgar 2007). Illegal wildlife use involves social networks that include civilians, public officials, and criminal groups (Carpio-Domínguez et al. 2023). Melgoza et al. (2017) illustrate this with the example of illegal wildlife trafficking in Mexico, identifying three key sectors responsible:

1. Poachers or illegal collectors: Their activity as a livelihood/subsistence activity.
2. Trafficking networks: Comprised of gatherers, transporters, retail distributors, merchants, entrepreneurs, and officials, primarily motivated by profit.
3. Consumers: Their lack of awareness, information, or ethical behavior contributes to the continuation of illegal activities.

Organized crime exploits weaknesses in enforcement, governance, and regulations (UNODC 2020). In developing countries like Mexico, issues such as institutional weakness, corruption, staff shortages, and lack of training are significant barriers in combating illegal wildlife trafficking (Melgoza et al. 2017). Corruption is a central factor in the illegal wildlife trade, present at all levels and stages of these criminal chains (UNODC 2020). Some public officials involved in wildlife management benefit personally through corrupt practices (UNODC 2020). Accepted bribes serve various purposes, such as: Gaining information about wildlife movement or patrol schedules; preventing enforcement actions during capture events; obtaining permits or licenses for transporting illegal specimens across borders; and facilitating money laundering (Melgoza et al. 2017; UNODC 2020).

In 2014, the UNODC analyzed wildlife and forest crimes in Mexico, proposing more than fifty recommendations to the national government for prevention and

combat. These include strengthening environmental laws, expanding PROFEPA's authority to investigate, collect evidence, and pursue legal actions, designing, developing, and implementing a database system to organize and record the actions taken by PROFEPA. These measures aim to improve enforcement, reduce illegal activities, and support the sustainable management of wildlife in Mexico.

Conclusions

This study demonstrates that the illegal use of live wildlife species is a global issue that manifests significantly in Mexico. The exact number of species used illegally in Mexico remains unknown, and existing reports and studies on the subject tend to underestimate the problem. Birds represent the group with the highest number of seized organisms, followed by reptiles, mammals, fish, crustaceans, amphibians, mollusks, insects and arachnids, and marine invertebrates. The total number of seized animals has fluctuated over time, with an alarming 97% decrease from 2013 to 2022, which may reflect weak law enforcement and a lack of governance. Seized animals were reported in all 32 states of Mexico, with the reasons for confiscation varying according to the specific characteristics of each state. Mexico continues to serve as a transit country for wildlife. More than half of the live species seized in the country are classified under a risk category according to national regulations. Over the decade, 25 possible post-confiscation destinations were reported, with 40% of wildlife remaining in the private and illegal residence where the seizure occurred. The illegal use of wildlife in Mexico is a complex and multifactorial problem involving social networks at various levels, with corruption playing a significant role.

PROFEPA, the competent authority responsible for ensuring environmental justice through the application and enforcement of current federal environmental legislation, lacks the necessary powers to pursue environmental crimes criminally, as well as adequate financial, human, and technical resources. Mexico faces an urgent need to implement new strategies, strengthen existing ones, and update and reinforce current environmental laws. Additionally, increasing financial resources, expanding seizure operations, and granting PROFEPA the necessary authority to combat the illegal use of species are critical. It is also crucial to ensure access to information on confiscations in Mexico and to share this data both nationally and internationally to combat the illegal wildlife trade at both local and global levels.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

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Use of AI

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Author contributions

Conceptualization: PFA, GOM. Data curation: PFA. Formal analysis: PFA. Methodology: PFA, GOM. Writing – original draft: PFA. Writing – review and editing: GOM.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

List of Seized Live Species in Mexico by PROFEPA (January 2012 – June 2023)

Authors: Patricia Frías-Álvarez, Gustavo Ortiz-Millán

Data type: docx

Explanation note: This appendix presents a list of seized live species in Mexico by PROFEPA from January 2012 to June 2023.

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Link: https://doi.org/10.3897/natureconservation.59.153452.suppl1

Supplementary material 2

The original database provided by PROFEPA

Authors: Patricia Frías-Álvarez, Gustavo Ortiz-Millán

Data type: xlsx

Explanation note: The original database provided by PROFEPA of the number of live wild animals seized in Mexico from 2012-2023.

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